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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,186	07/11/2005	David R. Forester	3122R-01	7610

7590
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EXAMINER

FERGUSON, CHANTIL L

ART UNIT	PAPER NUMBER
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1797

MAIL DATE	DELIVERY MODE
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10/03/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/517,186

Applicant(s)

FORESTER ET AL.

ExaminerCHANTEL FERGUSON-
GRAHAM**Art Unit**

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2005.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-24 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 3/24/2005
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Summary

1. This is the initial Office action based on the 10/517186 application filed July 11, 2005.
2. Claims 1-24 are pending and have been fully considered.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1 – 5 and 7 - 13, are rejected under 35 USC 103 (a) as being obvious over WADDOUPS (US PATENT 5021173), and in view of LOON (US PATENT 2744069).

Regarding claims 1 – 5, and 7 – 13, WADDOUPS et al. discloses jet fuel with a concentration of the additive in the fuel in the range of typically from about 0.001 to about 0.1 weight percent (**col. 17 lines 1-9**) (**10 – 1000 ppm**). The alkylation may be carried out in the presence of a catalyst with alkylating agents having from about 3 to more than 30 carbon atoms such as, for example, haloparaffins, olefins that may be obtained by dehydrogenation of paraffins, polyolefins as, for example, polymers from ethylene, propylene, etc. (**col. 23**

lines 53-58). The olefin polymers will usually have number average molecular weights within the range of about 700 to 5000 (**polyalkenyl substituent of (B)(2) has a number average molecular weight of 300 to 5,000; hydrocarbyl substituent of (B)(1) has a number average molecular weight of 600 to 3,000)** (col. 6 lines 8-10). An especially useful starting material for a highly potent dispersant additive made in accordance with this invention is polyisobutylene (**col. 6 lines 16-18**). In addition, the lubricant compositions can also contain rust inhibitors such as lecithin, sorbitan monooleate, dodecyl succinic anhydride or ethoxylated alkyl phenols; and other additives such as pour point depressants, viscosity index improvers, other antioxidants (**antioxidant**) (e.g., zinc dialkyldithiophosphates), basic alkaline earth metal detergents (**col. 2 lines 42-54**), are C₄ to C₁₈ non-conjugated diolefin (**olefin selected from the group consisting of olefins having 2 to 12 carbon atoms**) (col. 5 line 67; col. 6 line 1). Heretofore, many lubricants and fuels have contained compounds known as friction modifiers (also termed "lubricity additives"), which act to reduce the friction of internal engine parts and thereby increase fuel economy (**col. 1 lines 20-23**). Such concentrates will typically contain (on an active ingredient (A.I.) basis) from about 3 to about 45 wt. % (**col. 18 lines 45-47**). The amine is readily reacted with the dicarboxylic acid material, e.g. alkenyl succinic anhydride, by heating an oil solution containing 5 to 95 wt. % of dicarboxylic acid material (**col. 8 lines 64-66**). Such concentrates will typically contain from about 20 to about 80%, and preferably from about 25 to about 65%, by weight total active additive (**col. 18 lines 58-60**). The sulfonic acids are typically obtained by the sulfonation of alkyl substituted aromatic hydrocarbons such as those obtained from the fractionation of petroleum by distillation and/or extraction or by the alkylation of aromatic hydrocarbons as, for example, those obtained by alkylating xylene

(wherein the solvent comprises xylenes) (col. 23 lines 45-50) . The composition wherein said nucleophilic reactant (b) is an amine; said amine is a polyethylenepolyamine **(see claim 4)**. Suitable friction modifiers are fatty acid derivatives comprising esters such as triglycerides or monoesters from polyols esters such as glycol monooleate and pentaerythritol monooleate amides such as oleamide or amides made from polyamines or alkanolamines; and heterocycles made by condensing compounds such as aminoquinidine with carboxylic acids to form triazoles **(col. 4 lines 39-57)**. A preferred group of ashless dispersants are those derived from polyisobutylene substituted with succinic anhydride groups and reacted with polyethylene amines, e.g. tetraethylene pentamine, pentaethylene hexamine, polyoxyethylene and polyoxypropylene amines, e.g. polyoxypropylene diamine, trimethylolaminomethane and pentaerythritol, and combinations thereof. One particularly preferred dispersant combination involves a combination of (A) polyisobutylene substituted with succinic anhydride groups and reacted with (B) a hydroxy compound, e.g. pentaerythritol, (C) a polyoxyalkylene polyamine, e.g. polyoxypropylene diamine, and (D) a polyalkylene polyamine, e.g. polyethylene diamine and tetraethylene pentamine; using about 0.3 to about 2 moles each of (B) and (D) and about 0.3 to about 2 moles of (C) per mole of (A). Another preferred dispersant combination involves the combination of (A) polyisobutenyl succinic anhydride with (B) a polyalkylene polyamine, e.g. tetraethylene pentamine, and (C) a polyhydric alcohol or polyhydroxy-substituted aliphatic primary amine, e.g., pentaerythritol or trimethylolaminomethane **(col. 10 lines 19-42) (wherein the polyamine of the mixture of (B)(1) is a polyethylenepolyamine and the polyethylenepolyamine is introduced into the reaction after the polyhydric alcohol)**.

Another preferred dispersant combination involves the combination of (A) polyisobutenyl succinic anhydride with (B) a polyalkylene polyamine, e.g. tetraethylene pentamine (**polyethylenepolyamine bottoms**), and (C) a polyhydric alcohol or polyhydroxy-substituted aliphatic primary amine, e.g., pentaerythritol or trimethylolaminomethane (**col. 10 lines 26-43**) (**wherein the polyamine of the mixture of (B)(1) is a polyethylenepolyamine and the polyethylenepolyamine is introduced into the reaction after the polyhydric alcohol**). Hydroxyamines which can be reacted with the aforesaid long chain hydrocarbon substituted dicarboxylic acid material to form dispersants include tris(hydroxymethyl)amino-methane (**col. 9 lines 28-30; col. 10 lines 9-10**) (**also known as trimethylolaminomethane**) (**wherein the acid catalyzed condensation product of (B)(1) is prepared from the reaction of polyethylenepolyamine bottoms and tris(hydroxymethyl)aminomethane**). A preferred group of ashless dispersants are those derived from polyisobutylene substituted with succinic anhydride groups and reacted with polyethylene amines, e.g. tetraethylene pentamine. Natural base oils include mineral lubricating oils which may vary widely as to their crude source, e.g. whether paraffinic (**jet A**), naphthenic (**jet B**), mixed, paraffinic-naphthenic, and the like; as well as to their formation, e.g., distillation range, straight run or cracked, hydrofined, solvent extracted and the like (**col. 17 lines 34-40**) (**jet fuel is selected from the group consisting of Jet A, and Jet B**). Polyvalent metal alkyl salicylate and naphthenate materials are known additives for lubricating oil compositions to improve their high temperature performance and to counteract deposition of carbonaceous matter on pistons (**col. 24 lines 25-29**). An increase in reserve basicity of the polyvalent metal alkyl salicylates and naphthenates can be realized by utilizing alkaline earth metal, e.g., calcium,

salts of mixtures of C_8 - C_{26} alkyl salicylates and phenates or polyvalent metal salts of alkyl salicylic acids, said acids obtained from the alkylation of phenols followed by phenation, carboxylation and hydrolysis which could then be converted into highly basic salts by techniques generally known and used for such conversion (**col. 24 lines 29-39**). Ashless, nitrogen or ester containing dispersants useful in this invention comprise boron-free members selected from the group consisting of (i) oil soluble salts, amides, imides, oxazolines and esters, or mixtures thereof, of long chain hydrocarbon substituted mono and dicarboxylic acids or their anhydrides; (ii) long chain aliphatic hydrocarbon having a polyamine attached directly thereto; and (iii) Mannich condensation products formed by condensing about a molar proportion of long chain hydrocarbon substituted phenol with and formaldehyde (**formaldehyde**) polyalkylene polyamine; wherein said long chain hydrocarbon group in (i), (ii) and (iii) is a polymer of a monoolefin. A(i) The long chain hydrocarbyl substituted dicarboxylic acid producing material, e.g. acid, anhydride, or ester, used in the invention includes a long chain hydrocarbon, generally a polyolefin, substituted typically with an average of at least about 0.8, usefully from about 1.0 to 2.0 (e.g. 1.0 to 1.6), preferably about 1.1 to 1.4 (e.g. 1.1 to 1.3) moles, per mole of polyolefin, of an alpha- or beta-unsaturated dicarboxylic acid, anhydride or ester thereof, such as fumaric acid, itaconic acid, maleic acid, maleic anhydride, chloromaleic acid, dimethyl fumarate, chloromaleic anhydride, acrylic acid, methacrylic acid, crotonic acid, cinnamic acid, and mixtures thereof (**col. 5 lines 26-56**).

WADDOUNS et al. does not explicitly teach a method of adding to the jet fuel a thermal-stability improving amount of the concentrate composition, or a method to reduce

deposits in a fuel circulation system and combustion system of a jet engine, comprising: operating the jet engine with the fuel composition.

However LOON et al. teaches two samples of lubricating oil were tested in a Caterpillar single-cylinder 4-stroke engine (**col. 12 lines 21-22**). During the test the temperature is maintained at $160^{\circ} \pm 3^{\circ}\text{C}$ by means of an electric heating element. The rate at which the journal rotates during the test is 1400 revolutions per minute. After 3 hours the oil is drained off; the half bearings are then washed with gasoline, dried and weighed. The loss of weight is a measure of the corrosive action of the oil (**col. 13 lines 39-45**). From this it will be seen that the lubricating additives having a high basicity, which are obtained according to the process of the invention possess considerably better anti-corrosion properties (**col. 13 lines 51-56**). (**meets the limitations of claims 1 – 5, and 7 – 13**)

WADDOUPS et al. and LOON et al. are analogous art because they are from the same field of endeavor.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the friction modifiers (also termed "lubricity additives"), which act to reduce the friction of internal engine parts and thereby increase fuel economy of WADDOUPS et al. (**col. 1 lines 20-25**) by incorporating the method of reducing the deposit in engines with a lubricating oil of LOON et al. (**col. 13 lines 51-56**).

The motivation would have been to the improvement of the lubricity and load carrying ability of a synthetic ester lubricating oil as taught by WADDOUPS et al. (**col. 1 lines 25-26**); to minimize various deleterious effects of operating internal combustion engines as taught by LOON et al. (**col. 1 lines 21-23**).

Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

6. Claims 6 and 14-24, are rejected under 35 USC 103 (a) as being obvious over WADDOUPS (US PATENT 5021173), in view of LOON (US PATENT 2744069); and further in view of GUTIERREZZ (US PATENT 4866139).

Regarding claims 6 and 14 - 24, modified WADDOUPS et al. as referenced above in claims 1 – 5, and 7 – 13 are incorporated into this rejection. In addition to the disclosure above WADDOUPS et al. teaches the polyester V.I. improvers are generally polymers of esters of ethylenically unsaturated C₃ to C₈ **(olefin selected from the group consisting of olefins having 2 to 12 carbon atoms)** mono- and dicarboxylic acids such as methacrylic and acrylic acids, maleic acid, maleic anhydride, fumaric acid, etc. **(a methacrylate polymer prepared from a mixture of alkyl methacrylate monomers)** (col. 20 lines 12-23). Other esters include the vinyl alcohol esters of C₂ to C₂₂ fatty or mono carboxylic acids **(a vinyl ester of a carboxylic acid)** (col. 20 lines 24-25). Such concentrates will typically contain from about 20 to about 80%, by weight total active additive **(col. 18 lines 58-59)** **(compositions for component (D) is present in the concentrate composition at 1-70 weight %)**. Jet fuel with a concentration of the additive in the fuel in the range of typically from about 0.001 to about 0.5 weight percent **(col. 17 lines 1-9) (10 – 5000 ppm)**. The invention relates to oil soluble additive mixtures useful in fuel and lubricating oil compositions, including concentrates containing said additives, and methods for their manufacture and use **(col. 1 lines 11-19)**. Other esters include the vinyl alcohol esters of C₂ to C₂₂ fatty or mono carboxylic acids, preferably saturated such as vinyl acetate **(col. 20 lines 24-30)** **(wherein the copolymer of (D)(11) is a copolymer of ethylene and vinyl**

acetate). These ester friction modifier additives are generally derived from the esterification of a polycarboxylic acid with a di- or trihydric alcohol (e.g., glycol, glycerol, oxa-alkane diols). Such esters have been heretofore used in lubricating oils as friction modifiers, and the methods of preparation. The hydroxyamide derivatives of such polycarboxylic acids can be prepared by condensing the acid at elevated temperature with a hydroxyamine (e.g. alkanol amines or aminoalcohols, such as ethanolamine, diethanol-amine) **(col. 11 lines 11-15)** **(wherein the reaction product of (D)(13) is the reaction product of an alkenylsuccinic acylating agent and alkanolamine wherein the alkenyl group and the alkanolamine is dimethylethanolamine or diethanolamine).** One particularly preferred dispersant combination involves a combination of (A) polyisobutene substituted with succinic anhydride groups and reacted with (B) a hydroxy compound, e.g. pentaerythritol, (C) a polyoxyalkylene polyamine, e.g. polyoxypropylene diamine, and (D) a polyalkylene polyamine, e.g. polyethylene diamine and tetraethylene pentamine. Using about 0.3 to about 2 moles each of (B) and (D) and about 0.3 to about 2 moles of (C) per mole of (A) **(wherein the esterified copolymer of (D)(8) is further reacted with an amine) (a reaction product of a hydrocarbyl substituted acylating agent and an amine selected from the group consisting of an alkanolamine and a polyamine) (col. 10 lines 18-42).**

Modified WADDUPS et al. does not teach that the hydrocarbyl substituent of (D)(13) has 8 to 40 carbon atoms; or that the alkyl substituent of the alkylphenol has 14 to 60 carbon atoms; or wherein the polyalkenylthiophosphonate ester of (B)(2) is a pentaerythritol ester of a polyisobutenylthiophosphonic acid.

However GUTIERREZ et al. discloses wherein at least one of the X substituents is a hydroxyalkyl group of the formula $-(CH_2)_n-OH$, and wherein n is 1 to 3 and containing 2 to

60 carbon atoms (hydrocarbyl substituent of (D)(13) has 8 to 40 carbon atoms; or that the alkyl substituent of the alkylphenol has 14 to 60 carbon atoms) (col. 30 lines 18-23). Useful polyol compounds for the esterification of the hydrocarbyl substituted dicarboxylic acid material include pentaerythritol (col. 9 lines 20-25, line 40). The reaction between the polyol and the hydrocarbyl substituted dicarboxylic acid material may be exemplified by the following reaction scheme which represents the esterification of polyisobutenyl succinic anhydride with pentaerythritol: where PIB is polyisobutylene (col. 10 lines 43-66). Reacted hydrocarbyl substituted C_4 - C_{10} monounsaturated dicarboxylic acid producing material, which, in turn, preferably was made by reacting a polymer of a C_2 to C_{10} monoolefin (polyalkenyl), with a C_4 to C_{10} monounsaturated acid, anhydride or ester (thiophosphonate ester), such that there are dicarboxylic acid producing moieties per molecular of said olefin polymer used in the reaction mixture, and then, post reacting the substituted acid, anhydride or ester with a polyol such as pentaerythritol (wherein the polyalkenylthiophosphonate ester of (B)(2) is a pentaerythritol ester of a polyisobutenylthiophosphonic acid) (abstract).

WADDOUS et al. and GUTIERREZ et al. are analogous art because they are from the same field of endeavor.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to the friction modifiers (also termed "lubricity additives"), which act to reduce the friction of internal engine parts and thereby increase fuel economy of WADDOUS et al. (col. 1 lines 20-25), by incorporating the reactants of GUTIERREZ et al. to include pentaerythritol ester of a polyisobutenylthiophosphonic acid and a polyalkenylthiophosphonate ester.

The motivation would have been to create oil soluble dispersant additives useful in fuel and lubricating oil compositions, including concentrates containing said additives, and methods for their manufacture and use as taught by GUTIERREZ et al. (col. 1 lines 17-20).

Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. WESTFALL et al. (US PG PUB 20020116868) teaches a continuous process for making an aqueous hydrocarbon fuel emulsion.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHANTEL FERGUSON-GRAHAM whose telephone number is (571)270-5563. The examiner can normally be reached on M-Th 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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